SFT 835

Operation Manual

titan logix corp.

Head Office
4130 – 93 Street
Edmonton, AB, Canada T6E 5P5

Saskatchewan Office
Box 460, 103 Cenaiko Street
Lampman, SK Canada S0C 1N0

Manufactured in Canada

Toll Free 1-877-462-4085 **Web Site** www.titanlogix.com **E-Mail** sales@titanlogix.com

SFT835

Flow Totalizer / Rate Meter

For servicing, please contact

Titan Logix Corp. in

Edmonton, Alberta, Canada

Website: www.titanlogix.com

P: (780) 462-4085

F: (780) 450-8369

e-mail: sales@titanlogix.com

Toll Free: 1-877-462-4085

Titan Logix Corp.

SFT 835

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Quick Start

This section gives the locations, in this manual, for the essential information required to get the SFT835 up and running. This configuration will set up the SFT835 for 4-20 mA operation and, optionally, pulse output.

Note: With the execption of the Pulse Output Connection all of these steps are required for the SFT835 to operate properly.

Installation

Refer to the Environmental, Outline and Mounting sections on pages 8 and 9.

Turbine Connection

Refer to the Turbine Input section on page 11.

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Refer to the 4-20mA section on page 14.

Pulse Output Connection (Optional)

Refer to the Pulse Output section on page 13.

Entering a K Factor

Refer to the K Factor and Engineering Units section on pages 20 to 22

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Refer to the Rate Time Base section on page 23.

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Refer to the Full Scale Rate section on page 25.

Introduction

About this Manual

This instruction manual provides information specific to the Sherrex Systems SFT835 Flow Totalizer / Rate Meter. Other peripheral equipment should be supplied with its own instruction manual and that manual should be referred to for proper operation of the peripheral equipment.

It is essential that this manual be read and understood for proper installation and operation of your SFT835.

This manual includes:

QUICK START:	A quick reference to get the SFT835 up and running with the minimum required features.
INTRODUCTION:	Briefly describes the key features of the SFT835.
INSTALLATION:	Detailed description of mounting and wiring of external equipment.
OPERATION:	Describes the operation and use of the features of the SFT835.
PROGRAMMING:	Describes the procedure for programming the SFT835.
TROUBLESHOOTING:	Describes several quick problem solving techniques.
SPECIFICATIONS:	Describes the physical and operational characteristics.

About the SFT835

The SFT835 is a loop powered flow totalizer and rate meter. The SFT835 accepts input pulses from a turbine meter and uses those pulses to calculate the flow total and rate in a pipeline. The SFT835 displays the information on a built in high contrast LCD display. For remote flow measurement the SFT835 is equipped with a loop powered 4-20mA signal for monitoring flow rate, as well as an isolated, normally open, dry contact pulse output. These outputs can be K Factored or linearized for a higher degree of accuracy.

These features combine to make the SFT835 a versatile solution for flow measurement applications.

Please refer to the Installation section of this manual for directions on how to connect and set up the SFT835.

Main Features

Enclosure:	CSA Class I, Division I, Groups B, C, & D, NEMA 4X
Input / Output:	Turbine input from 1Hz to 3kHz at 20mV P-P minimum. Adjustable pulse input sensitivity for use in noisy environments. Flow total and rate are displayed on a high contrast LCD display. 4-20mA and isolated pulse output which can be K Factored or linearized for connection to a standard RTU or PLC input.
Reliability:	Built using industrial specified components to ensure long life and reliability even in harsh conditions.
Programming:	The SFT835 can be programmed by the operator. The programmable features are K Factor (0000001 to 9 999 999 with up to 2 decimal digits), Rate Time Base (per min, per hour, or per day), Display Alternating Time (alternates between total and rate), Full Scale Rate (99 999 with up to 2 decimal digits), Total Decimal Point Position, 16 Point Linearization parameters, and K Factored Pulse Output Multiplier.

Installation

Installation should only be performed by qualified personnel, and in accordance with local governing regulations.

!WARNING!

To prevent ignition of hazardous atmosphere, disconnect circuits or prove the area to be nonhazardous before removing cover.

CURLEE ETEFC63 Enclosure

Seals are required within 6" of the enclosure on all conduits if being installed in a hazardous area.

APPLETON GRC-100 Enclosure

Seals are required within 2" of the enclosure on all conduits if being installed in a hazardous area.

Environmental

Choose a mounting location suited to the SFT835 enclosure.

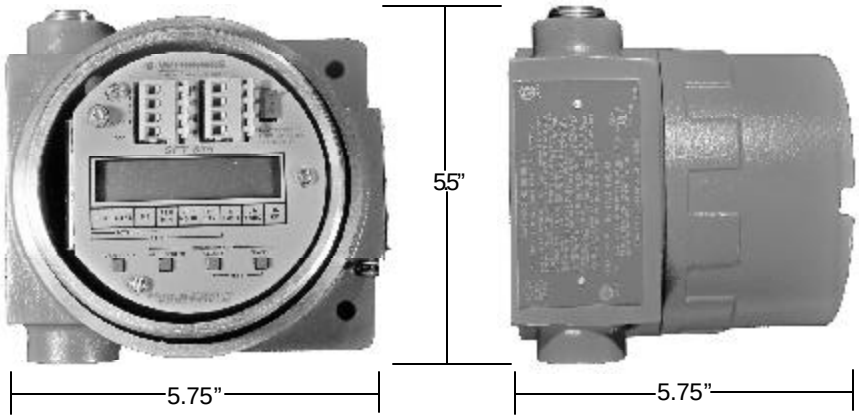
The ideal SFT835 mounting location is where:

1. Turbine Pick-up is as close as possible.
2. Mounting Surface has minimal vibration.
3. Ambient temperature is always within -40°C to +70°C (-40°F to +149°F).
4. Cable lengths are minimal.

Avoid mounting locations where the SFT835 is:

- ➢ Vibrating.
- ➢ Close to high voltage / current runs, contactors, SCR control devices, or frequency inverters.

Outline



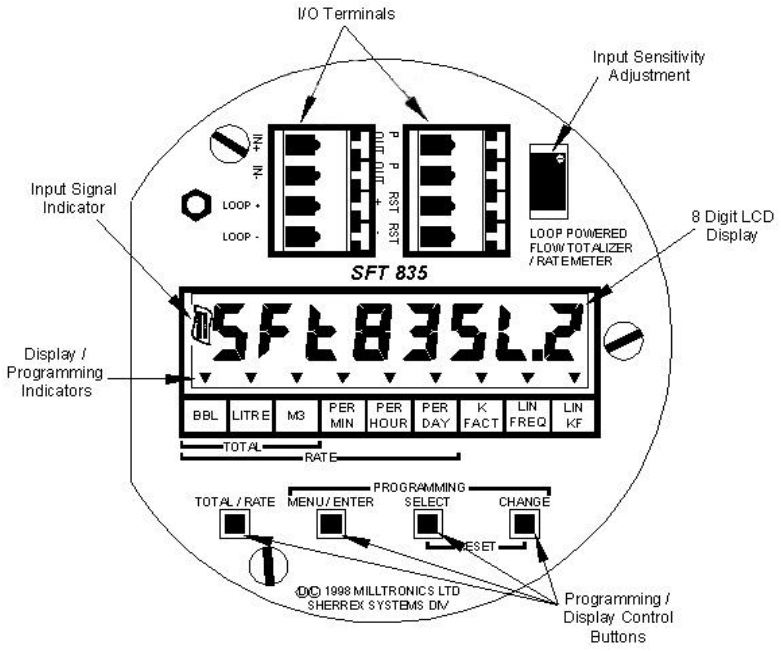
Mounting

The SFT835 can be mounted on a 1” NPT flow meter by using a 3/4” to 1” adapter and a magnetic pick-up extension. An MS-97 style connector is supplied with the SFT835 for connecting to 3030 style magnetic pick-ups.

Interconnection

Perform all wiring in accordance with local governing regulations.

Please refer to the diagram below for the location of the programming buttons and the I/O terminals on the SFT835.

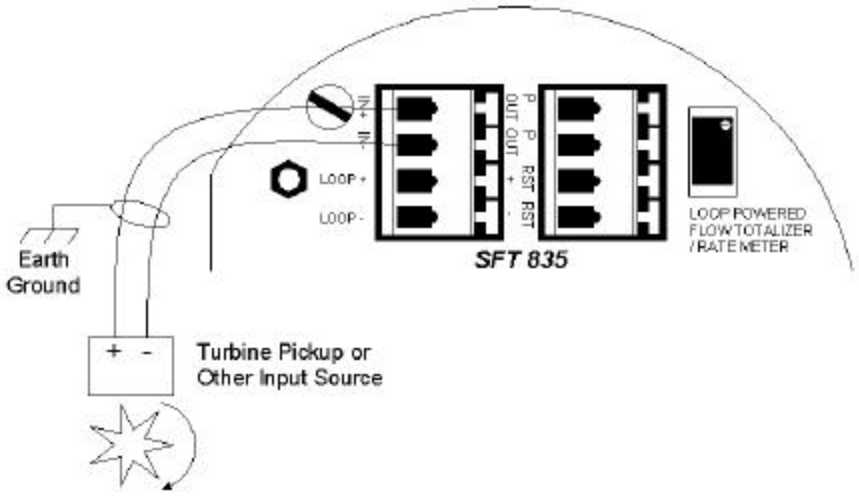


To connect external wiring to the terminal blocks, feed instrumentation cables through the cable channel, on the left-hand side of the unit, up to the terminal blocks. To install the wires into the vibration resistant terminal blocks, use a small flat head screwdriver (or other device that fits) and place it in the terminal block lever, press down, insert wire, then release.

Turbine Input

The SFT835 is designed for use with a magnetic pick-up from a flow meter, but may also be used with any pulsed signal provided that it is below the maximum input specification (30VRMS). Unless otherwise specified the SFT835 is shipped with an MS style connector for direct connection to a magnetic pick-up. If the SFT835 is not being connected to a magnetic pick-up the cable should be removed from the IN+ and IN- terminals and replaced with the cable from the input source being used. Ensure that the polarity is correct on the input signal being used (polarity doesn't matter if using the magnetic pick-up).

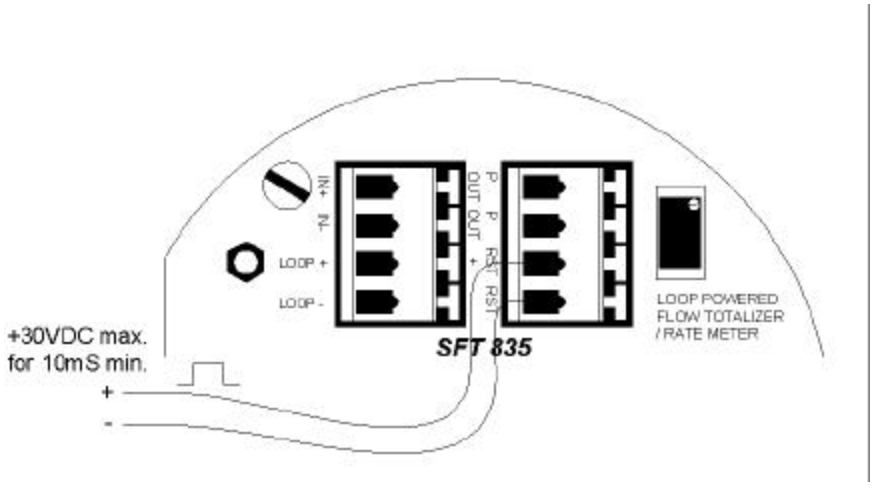
NOTE: To prevent improper operation and false readings, the SFT835 should be mounted as close as possible to the turbine's magnetic pick-up. If the SFT835 cannot be mounted close to the pick-up, use shielded cable and connect the shield to Earth Ground *at one end only*.



Reset Input

In order to reset the total on the SFT835 without having to open the case a reset input is provided. The reset input is optically isolated for use in a hazardous area. To remotely reset the unit a minimum 10mS pulse of no more than 30VDC must be applied to the reset input.

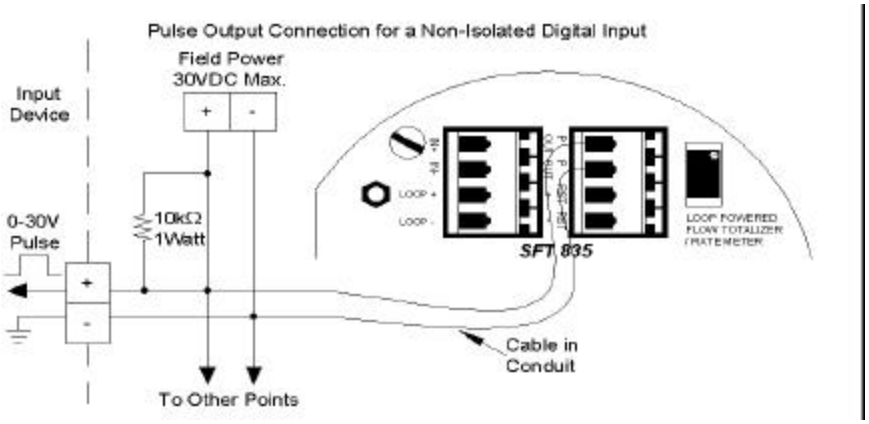
NOTE: Ensure that the polarity of the input is correct or damage to the opto-isolator is likely.

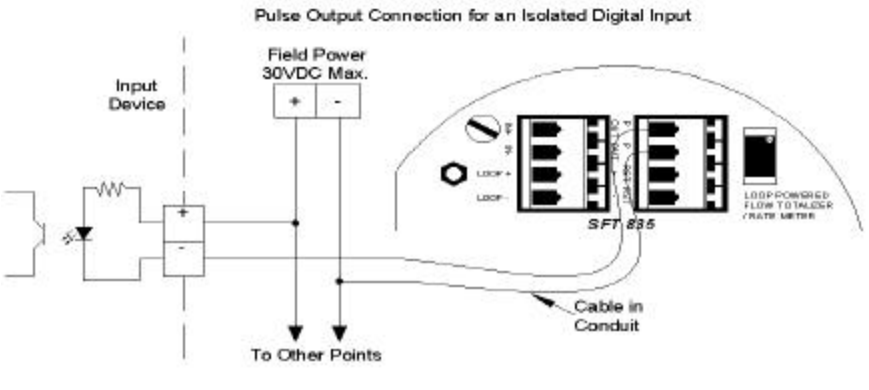


Pulse Output

The SFT835 is equipped with an isolated, normally open, dry contact output. This contact will close for 10mS each time the least significant digit on the display is incremented up to a maximum of 5 times per second. The contact is capable of switching up to 30VDC at 10mA. If the contact frequency is greater than 5 pulses per second, it may be necessary to change the K Factored Pulse Output Multiplier (POUt) and/or the Total Decimal Point Position (dEC) parameter to reduce the frequency (see the Programming section of this manual for details).

NOTE: The contact for the pulse output is a nonpolarized output. In order to use the pulse output external power *must* be applied to the contact.

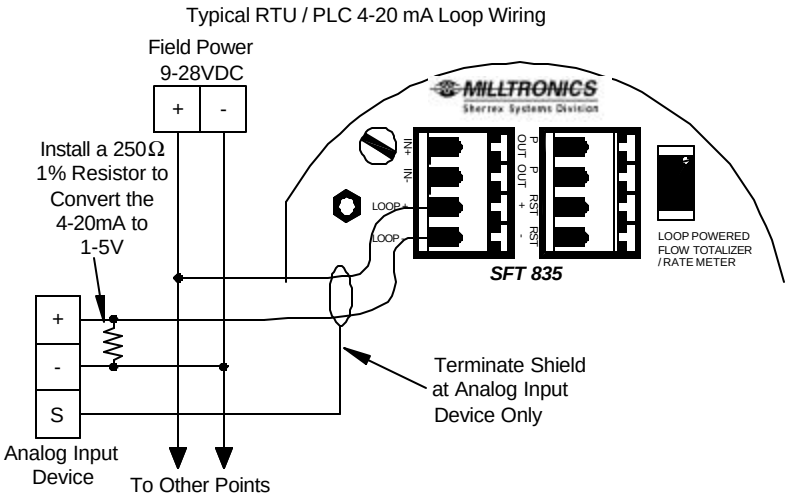




4-20mA Loop Power

The SFT835 is a loop powered device, this eliminates the need for running separate power wires to the unit. The loop current is adjusted between 4mA and 20mA relative to the flow rate in the pipeline and the Full Scale Rate (FSr) parameter. At no flow the output will be 4.00mA and at or above the FSr setting the loop current will be 20.0mA.

NOTE: The loop power is the *only* power connection which will power up the SFT835. T*his step cannot be skipped*. If this step is skipped the unit *will not operate*.



Input Sensitivity Adjustment

NOTE: The input sensitivity is preset at the factory to 20mVp-p. This is sufficient for most applications that the SFT835 is designed for. The input sensitivity should not need to be adjusted.

Other sources of poor signals should be explored before adjusting the sensitivity.

If the SFT835 appears to be too sensitive (picking up electromagnetic interference, noise, improper total or flow rate the input sensitivity may need to be decreased. To adjust the sensitivity of the input to the optimum setting follow the steps below:

1. Prove the area to be nonhazardous and remove the enclosure cover.
2. Reduce the flow at the turbine to the minimum expected flow rate.
3. Adjust the Input Sensitivity Adjustment in half turn increments CCW until the Input Signal Indicator stops flashing.
4. Adjust the Input Sensitivity Adjustment in quarter turn increments CW until the Input Signal Indicator begins flashing at a one second interval.
5. Adjust the input Sensitivity Adjustment an additional quarter turn

Input Sensitivity Adjustment: CW increases sensitivity

CCW decreases sensitivity

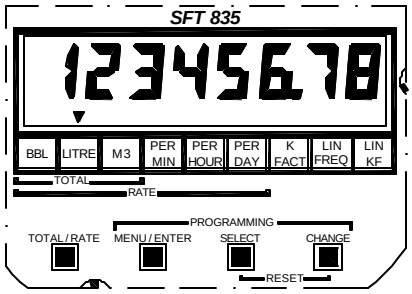
Operation

Displaying Total and Rate

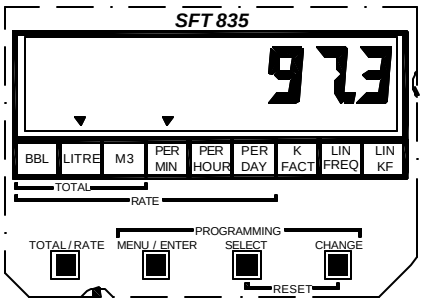
When operating normally the display on the SFT835 will alternate between total and rate. The length of time it displays each value is set through the ALt parameter. For example, if the ALt parameter is set to 10 the display will show total for 10 seconds, change to rate and display rate for 10 seconds, then change back to total. Refer to the Display Alternating Time section of this manual for details.

If the unit is installed in a nonhazardous area the Total / Rate key may be used to alternate between Total and Rate display. After the Total / Rate key has been pressed the selected display will remain on for 30 seconds and then the unit will revert to alternating the display.

The Total display is being shown when only one of the volume units is being indicated while the Rate display has one volume unit and one time base indicated.



Sample of a Total Display



Sample of a Rate Display

Resetting the Accumulated Total

The SFT835 has two methods for resetting the accumulated total to zero. If the unit is in a nonhazardous area, remove the cover then press and hold the Select and Change keys for about 1 second. The other method is to send a 10mS min. pulse at 30VDC max. into the isolated Reset input.

Displaying the Setup Parameters

The SFT835 has several setup parameters which allow for operation in many situations. To view the setup parameters press the Menu/ Enter key. Repeatedly pressing the Menu / Enter key will cycle the display through the parameters (see the Programming section of this manual for the order of display and a description of each parameter). To return to the Total and Rate display at any time simply press the Total / Rate key.

Programming

The SFT835 has seven parameters that can be programmed, they are:

- K Factor
- Rate Time Base
- Display Alternating Time
- Full Scale Rate
- Total Decimal Point Position
- Pulse Output Multiplier
- 16 Point Linearization

These seven parameters allow the SFT835 to be programmed to suit almost any application. Prior to putting the unit into service the K Factor, Rate Time Base, Full Scale Rate, and the engineering units are all the parameters that must be programmed.

NOTE: The programmed parameters should not be changed while the unit is in operation as incorrect totals and flow rates may result. After programming the unit, the total should be reset to ensure that the data is correct.

The four keys at the bottom of the SFT835 are used to program the unit. The keys function as follows:

Total / Rate: When not editing a value this key exits the menu structure and returns the display to the Total / Rate display.

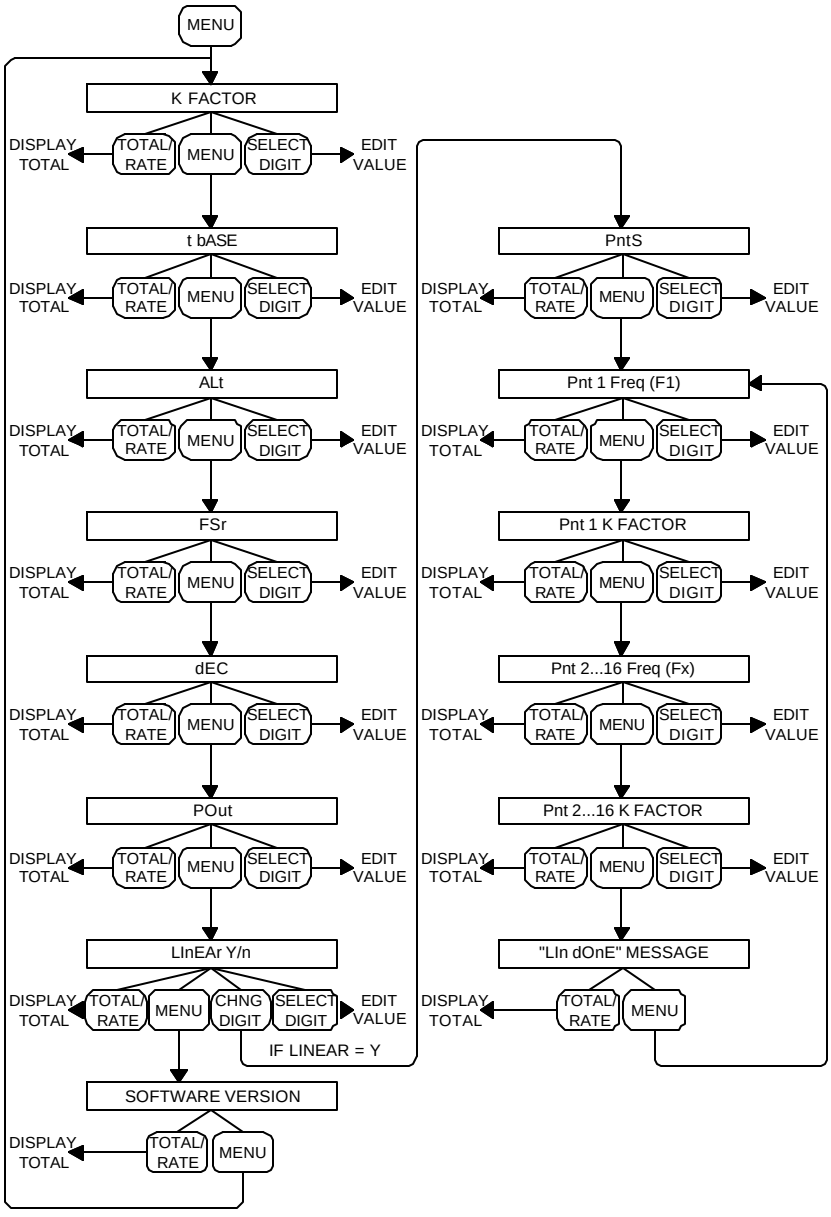
Menu / Enter: From the Total / Rate display this key enters the menu structure. When not editing a value inside the menu this key cycles through the menu entries. When editing a value this key saves the currently displayed value into memory and ends the editing of that value.

Select: When in the menu structure this key begins the editing of the currently displayed parameter or selects the next digit to edit in that parameter.

Change: When editing a value this key increments the currently selected digit.

SFT835 Menu Structure

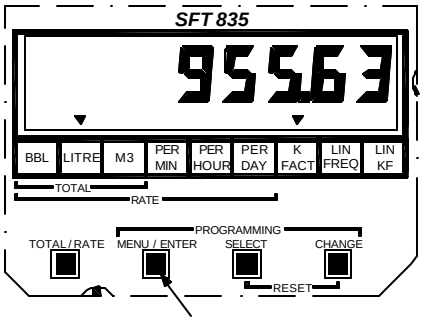
The SFT835 uses a menu structure for programming and setup of the unit. The following chart shows this menu structure.



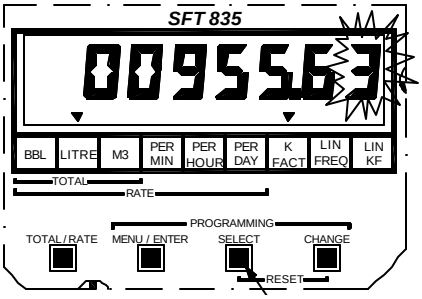
K Factor and Engineering Units

K Factor programming allows the SFT835 to be set up so the total accumulated flow can be read in engineering units such as barrels, litres, or cubic meters. This requires that the number of pulses from a turbine meter for one (1) unit of volume be known. For example, if a particular turbine produces 3885823 pulses per cubic meter, and it is required that the accumulated total be shown in cubic meters, the K Factor should be set to 3885823. With this setting, the total will increment one count for every 3885823 turbine pulses, giving a reading in cubic meters. The K Factor can be set to a maximum of 9 999 999 with up to 2 decimal positions (99 999.99 maximum when the 0.01 decimal position is selected).

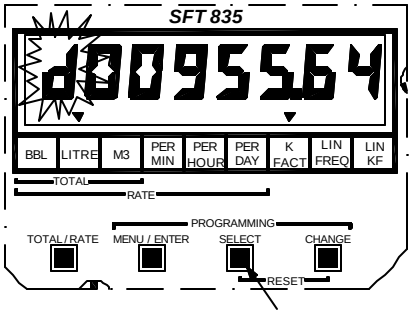
Engineering Unit programming allows the SFT835 to give a visual indication of the units being measured. This can be barrels, litres, or cubic meters. This setting is for *display purposes only*. Changing this setting has no effect on the calculation of the total or rate.



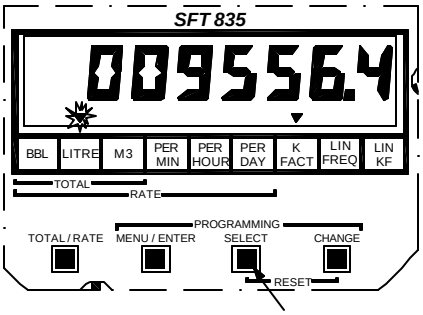
Press the Menu / Enter key until the indicators above K FACT and the current engineering units are on.



To begin programming the K Factor, press the Select key. All seven digits of the K Factor will appear on the display with the far right digit flashing to indicate that it is ready to be changed. Press the Change key to increment the digit. Press the Select key to advance to the next digit.



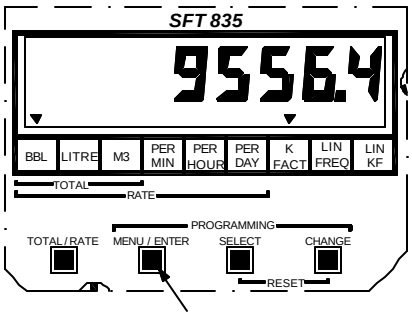
After all seven digits have been set pressing the Select key again will allow the K Factor decimal point to be set. To show that the decimal position is being edited a flashing d will appear on the left side of the display. Press the Change key to change the decimal point position.



After the decimal point position is set, pressing the Select key again will allow the engineering units to be changed. Press the Change key to move the engineering unit indicator to the desired position.

NOTE: The engineering unit indicator is a visual indication only, it will not adjust any calculations. To make the SFT835 measure in the units indicated, the K Factor must be adjusted.

Once the K Factor, decimal position, and engineering units are correct, press the Menu / Enter key to save the currently displayed value into memory and end editing.



Volume Conversion Factors

The following volume conversion factors are provided to aid in calculating the correct K Factor from one unit of flow to another.

1 US gallon	= 0.0037854 cubic meters
1 US gallon	= 3.78541 litres
1 cubic meter	= 264.17205 US gallons
1 cubic meter	= 6.28981 barrels
1 cubic meter	= 35.31467 cubic feet
1 litre	= 0.26417 US gallons
1 barrel = 42 US gallons	= 0.15899 cubic meters
1 cubic foot	= 0.0028317 cubic meters

Example:

A turbine meter produces 14727.27 pulses for 1 US gallon. How many pulses from this same turbine equals 1 cubic meter? 1 US gallon = 0.00379 cubic meters.

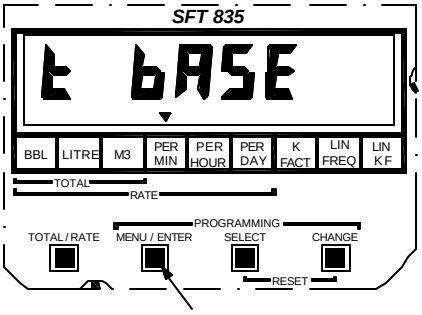
$$\text{Pulses per cubic meter} = \frac{14727.27\ (\text{pulses in 1 US gallon})}{0.0037854\ (\text{cubic meters in 1 US gallon})} = 3890545$$

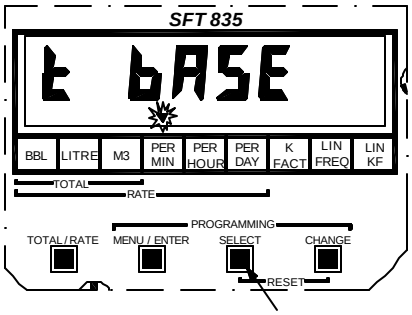
3890545 would be the K Factor entered for this particular turbine if the SFT835 was to indicate total flow in cubic meters.

Rate Time Base (t bASE)

The rate time base is used for calculation of flow rate. The SFT835 can be set to one of three time bases, per min, per hour, or per day.

Press the Menu / Enter key until t bASE and the current time base indicator appears on the display.





Press the Select key and the current time base indicator will begin to flash. Press the Change key to choose the desired time base.

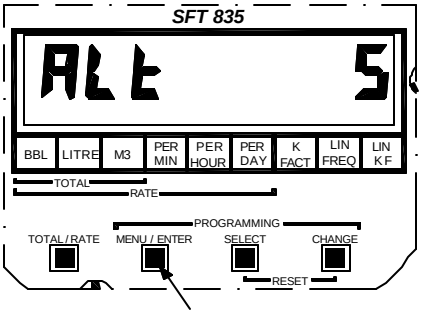
Once the desired time base is selected, press the Menu / Enter key to save the displayed value into memory and end editing.

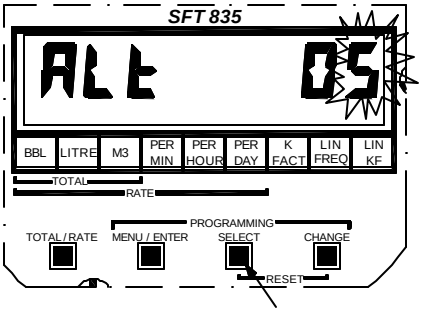
NOTE: The rate time base indicator affects the calculation of flow rate for the SFT835.

Display Alternating Time (ALt)

The display alternating time is the time that the SFT835 displays either total or rate before switching to the other. The time can be set from 0 to 20 seconds. At 0 seconds the display will not alternate between total and rate, the only way to switch between the two becomes the Total / Rate key. From 1 to 20 seconds will make the display show total for the allotted time then show rate for the same time before switching back to total.

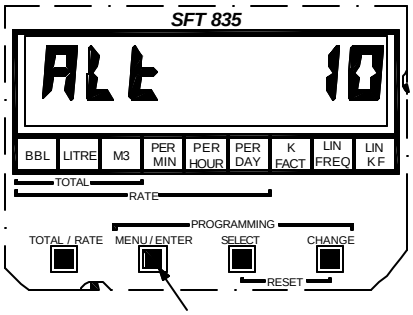
Press the Menu / Enter key until ALt xx appears on the display (where xx is the current setting in seconds).





To edit the display alternating time, press the Select key. Both digits of the time will appear on the display with the rightmost digit flashing. Press the Change key to increment the flashing digit or the Select key to advance to the next digit.

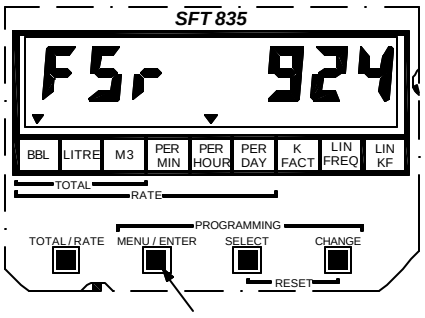
Once the time is set to the desired value, pressing the Menu / Enter key will save the currently displayed value into memory and end editing.

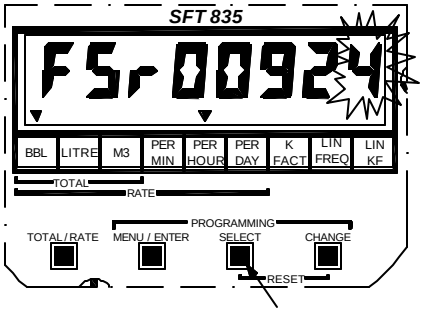


Full Scale Rate (FSr)

Full Scale Rate is used to set the flow rate at which the SFT835 will output 20.0mA. This rate should be set to the maximum expected flow in the pipeline. Any flow rate above this value will also be 20.0mA. The maximum value for this parameter is 99 999 (999.99 with two decimals). The FSr will be determined from the Rate Time Base setting.

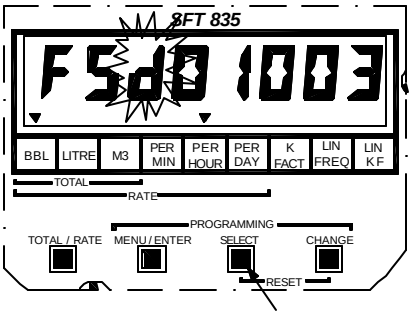
Press the Menu / Enter key until FSrxxxxx (where xxxxx is the current full scale rate), one total indicator, and one rate indicator appears on the display.

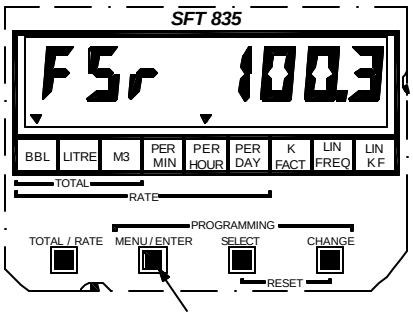




To edit the full scale rate press the Select key. All 5 digits will appear on the display with the rightmost digit flashing. Press the Change key to increment the flashing digit or the Select key to advance to the next digit.

After all 5 digits have been entered, pressing the Select key again will allow the decimal point position to be set. The FSr will change to FSd with the d flashing. To adjust the decimal point position, press the Change key until the decimal is in the desired location.





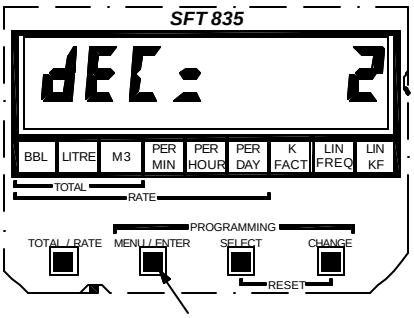
Once the full scale rate and decimal point position are correct, press the Menu / Enter key to save the displayed value into memory and end editing.

Total Decimal Point Position (dEC)

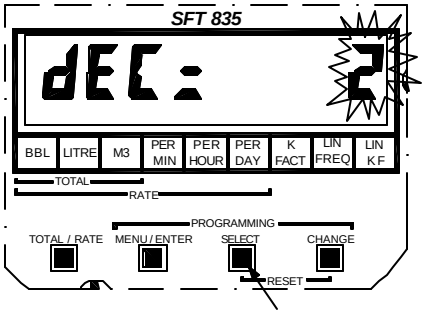
Four decimal point positions are provided to allow the accumulated total to be displayed in 1, 0.1, 0.01, and 0.001 units of flow. The SFT835 automatically calculates the proper division for the decimal position, therefore no changes to the K Factor are required for the different decimal positions. The K Factor should still be the correct value for 1 volume unit of flow.

NOTE: If the decimal position is changed to a lower position (i.e.: from 0.001 to 0.01) the portion of the decimal which is no longer displayed will be lost. The decimal position should not be changed while the unit is actively calculating totals as errors may result. For example: if the decimal position is changed from 0.001 to 0.01 and the value being displayed were 65.237, the 7 would be cut off and not used for calculation of the total.

Press the Menu / Enter key until dEC= x appears on the display (where x = the current decimal point position).



To edit the decimal point position, press the Select key. The current value will begin flashing. Press the Change key to increment the value. The values are as follows:



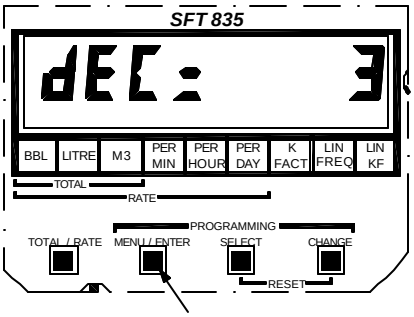
dEC = 0; no decimal point

dEC = 1; 0.1 (1/10) position

dEC = 2; 0.01 (1/100) position

dEC = 3; 0.001 (1/1000) position

Press the Menu / Enter key to save the current value into memory and end editing.



K Factored Pulse Output Multiplier (POut)

The K Factored Pulse Output feature of the SFT835 allows the user to set the number of pulses per unit of flow. For example: 1 pulse per 10 units of flow. In conjunction with the Total Decimal Point Position parameter the user can configure the SFT835 so the pulse output represents 1/1000, 1/100, 1/10, 1,10,100, or 1000 units of flow.

The pulse output multiplier is based on the far right digit of the displayed total value regardless of the current decimal position. This means that a pulse output multiplier of 1 will give one output pulse for each time the rightmost digit is incremented, a multiplier of 10 will give one pulse for each 10 times the rightmost digit is incremented (or 1 pulse for each time the second from the rightmost digit is incremented). The pulse output multiplier can be set to 1, 10, 100, or 1000. The following charts show the relationship between the decimal position and the pulse output multiplier. Use these charts to determine an appropriate value for the pulse output multiplier.

For the following charts use this key:

Multiplier = Pulse output multiplier setting

Units / Pulse = Number of flow units represented by one output pulse

0. = Representation of displayed decimal location

***** = Indication of the digit which will cause an output pulse when incremented

1	0	0	0	0	0	0	**0.**	Multiplier	Units / Pulse
							*	1	1
						*		10	10
					*			100	100
				*				1000	1000

Accumulated Decimal Point Position = 0.1 (dEC = 1)

1	0	0	0	0	0	**0.**	0	Multiplier	Units / Pulse
							*	1	0.1
						*		10	1.0
					*			100	10.0
				*				1000	100.0

Accumulated Decimal Point Position = 0.01 (dEC = 2)

1	0	0	0	0	**0.**	0	0	Multiplier	Units / Pulse
							*	1	0.01
						*		10	0.10
					*			100	1.00
				*				1000	10.00

Accumulated Decimal Point Position = 0.001 (dEC = 3)

1	0	0	0	**0.**	0	0	0	Multiplier	Units / Pulse
							*	1	0.001
						*		10	0.010
					*			100	0.100
				*				1000	1.000

The *maximum allowable pulse output frequency* when using the pulse output multiplier is 5Hz. To determine whether or not the current setting will be greater than 5Hz use this formula:

$$\frac{1}{\text{Units / Pulse (determine from chart) x Maximum Flow Rate (in Units / Second)}}$$

If the result is greater than 5Hz the setting will need to be adjusted to prevent errors at higher flow rates.

For example: An SFT835 is being used with a 1" turbine meter with a flow range of 5 - 50 gallons / minute. The total decimal point position is set to 0.01. The multiplier is set to 10.

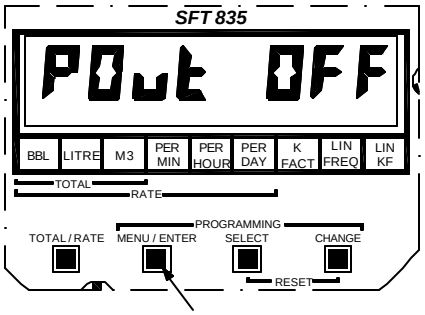
50 gallons / minute ÷ 60 seconds =0.833 gallons / second

$$\frac{1}{\text{0.10 pulses / unit x 0.833 gallons / second}} = 12\text{Hz}$$

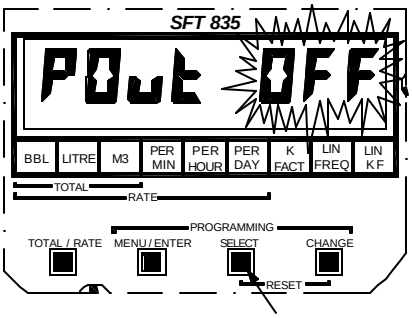
12Hz is greater than 5Hz exceeding the pulse out maximum specification. In this situation, the pulse output multiplier should be set to 100 to produce an output frequency of 1.2 Hz.

NOTE: The K Factored pulse output is based on the displayed total value. If this value is being calculated using 16 point linearization, the pulse output will also be affected by it.

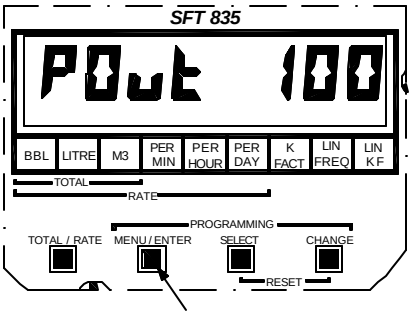
Programming the POut Parameter



Press the Menu / Enter key until the display shows POut x (where x is the current pulse output multiplier).



Press the select key to begin editing the value. The current value will begin flashing to indicate that it is ready to be changed. Press the Change key to increment the value. The values will cycle through OFF, 1, 10, 100, and 1000.



Once the desired value is on the display, press the Menu / Enter key to save the current value into memory and end editing.

16 Point Linearization

The 16 Point Linearization feature of the SFT835 compensates for the inherent nonlinearity of a flow meter over its specified operating flow range. Typically, the K Factor that equals one volume unit of flow changes with the flow rate. For example: the K Factor that equals one barrel at 50% flow is not the K Factor that equals one barrel at 10% flow. The linearization feature enables the SFT835 to use the correct K Factor for the current flow rate. This results in increased accuracy of the accumulated total and flow rate over the entire range for the turbine meter being used.

Linearization is achieved by programming up to 16 K Factors that correspond to the turbine meter's frequency output at specified flow rates. In order to achieve this each turbine meter in question must be proven at up to 16 appropriate flow meter frequency points. This service is usually provided by the turbine meter vendors at an additional cost. The following chart is for a 1" turbine meter that has been proven at ten different meter frequencies.

Meter Frequency (Hz)	Meter Flow Rate (gpm)	Meter K Factor (pulses / gallon)	Meter Temp. (°F)
F1 = 78	4.92	952.19	71.27
F2 = 159	9.94	960.12	71.26
F3 = 246	15.43	957.31	71.26
F4 = 313	19.67	955.63	71.24
F5 = 379	23.88	954.46	71.17
F6 = 486	30.63	953.41	71.12
F7 = 582	36.71	952.75	71.05
F8 = 656	41.43	950.86	70.99
F9 = 710	44.73	952.34	70.82
F10 = 796	50.20	952.16	70.43

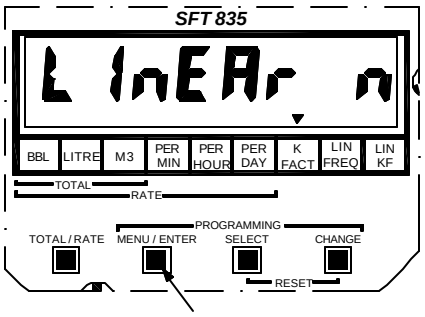
From the chart, it can be seen how much variation in K Factors there is over the operating range of a turbine meter. It can also be seen that more points for linearization will increase the accuracy of the measurement. It is not necessary to use all 16 points for linearization of the output, however the unit should be programmed with as many points as are available.

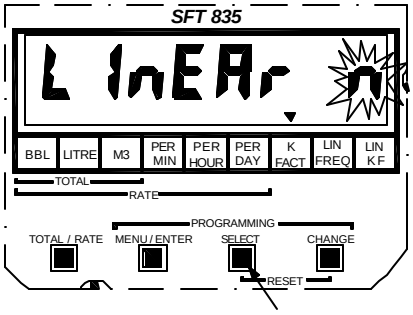
Enabling Linearization

In order to use the 16 point linearization feature of the SFT835 it must be enabled.

NOTE: Disabling the linearization feature after the parameters have been programmed does not erase the parameters. They will remain the same until the linearization is enabled again and the parameters are reprogrammed, they will just not affect the output.

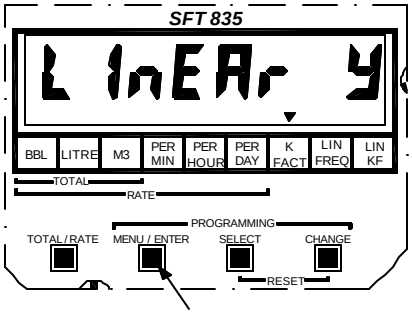
Press the Menu / Enter key until the display shows LInEAr x (where x is either Y or n). The indicator above K FACT will also be on.





To adjust the setting, press the Select key. The current setting will begin flashing to indicate it is ready to be changed. Press the Change key to choose between Y (enabled) or n (disabled).

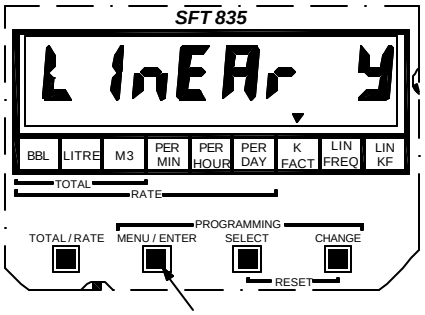
When the desired setting is displayed, press the Menu / Enter key to save the displayed setting into memory and end editing.

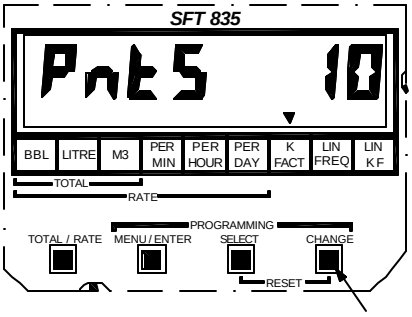


Accessing Linearization Parameters

The linearization parameters for the SFT835 are found in a separate menu from the main parameters of the unit. In order to view or change these parameters linearization *must* be enabled (see the Enabling Linearization section).

Press the Menu / Enter key until LInEAr Y appears on the display (if LInEAr n appears linearization *must* be enabled. See the Enabling Linearization section).



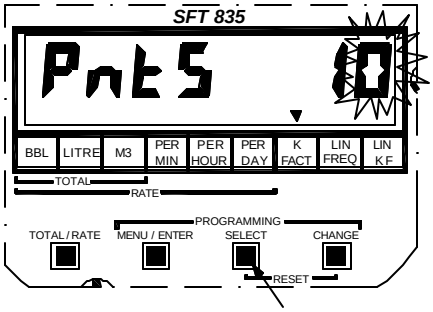


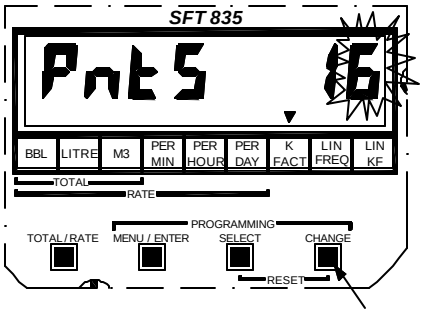
Press the Change key to enter the linearization menu. PntS x will appear on the display (where x is the current number of linearization points in use).

Setting the Number of Points (PntS)

The PntS x parameter is used to set the number of linearization points from 1 to 16. The number of points entered should be the maximum number available to ensure the linearization is as accurate as possible. To enter the number of points, access the linearization menu (see the Accessing Linearization Parameters section).

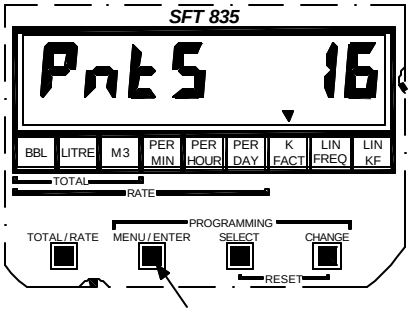
Press the Select key and the rightmost digit of the current setting will begin flashing.





Use the Change key to increment the current digit and the Select key to change digits. The value can be set from 1 to 16.

Press the Menu / Enter key to save the current value into memory and end editing. Pressing the Menu / Enter key again will begin cycling through the frequencies and K Factors for linearization.



NOTE: The maximum number of linearization points available should be used to increase the accuracy of the flow total and flow rate.

Setting the Linearization Frequencies and K Factors

Once the number of linearization points has been entered, pressing the Menu / Enter key will cycle through the frequencies and K Factors for linearization. At this time frequencies and K Factors can be set to the desired values.

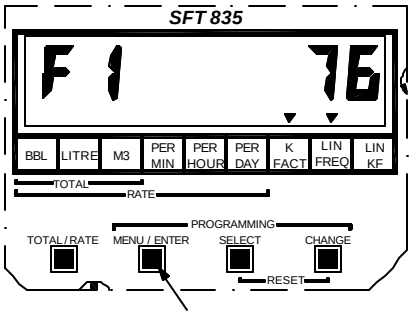
NOTE: All frequencies *must* be entered in *ascending order* (F1 must be the lowest frequency, F2 must be a higher frequency than F1, F3 must be higher than F2, etc.).

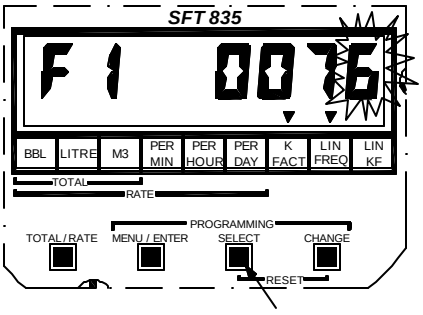
When editing the linearization K Factors, the *difference* between one K Factor and the next must not exceed the following values:

- If no decimal point is used for the K Factor the *difference* must not exceed 400 000
- If one decimal point (0.0) is used for the K Factor the *difference* must not exceed 40 000.0
- If two decimal points (0.00) are used for the K Factor the *difference* must not exceed 4000.00

For best results, all linearization K Factors should be entered with the same number of decimal points. This should be the maximum number of decimal points possible to increase accuracy.

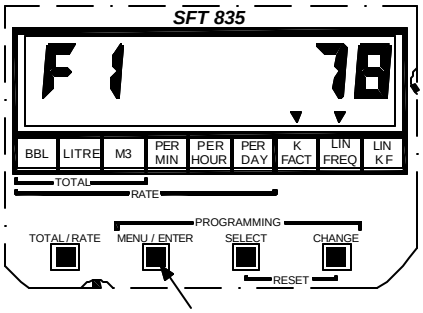
Press the Menu / Enter key until the frequency to change appears on the display. This is indicated by Fx xx (where x is the linearization point number, from 1 to 16, and xx is the current frequency setting) and the LIN FREQ indicator appearing on the display.

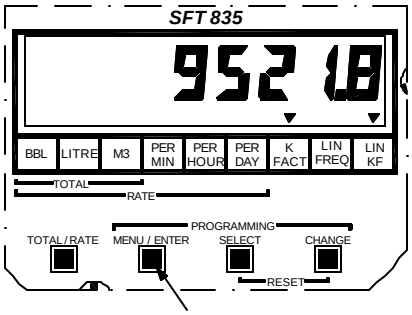




To edit the current frequency, press the Select key. All four digits of the frequency will appear on the display with the rightmost digit flashing. Press the Change key to increment the digit or the Select key to advance to the next digit.

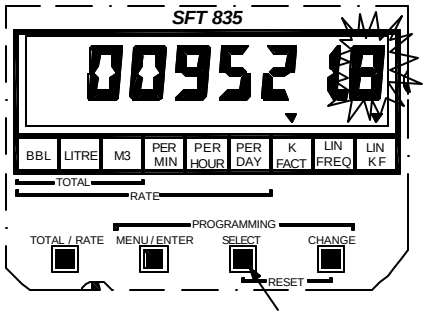
Once the desired value is displayed press the Menu / Enter key to save the displayed value into memory and end editing.

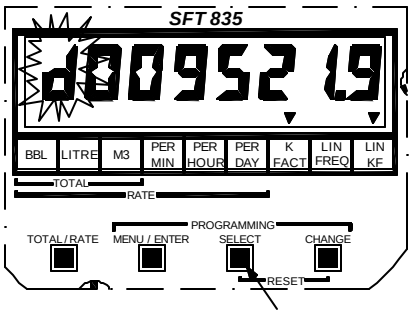




Press the Menu / Enter key to display the current K Factor for the frequency. The LIN KF indicator will appear on the display to show that a linearization K Factor is currently being displayed.

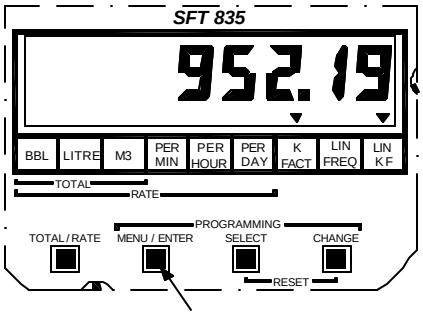
Press the Select key to begin editing the current K Factor. All seven digits of the K Factor will appear on the display with the rightmost digit flashing, the current volume indicator for the total will also appear. Use the Change key to increment the current digit and the Select key to advance to the next digit.



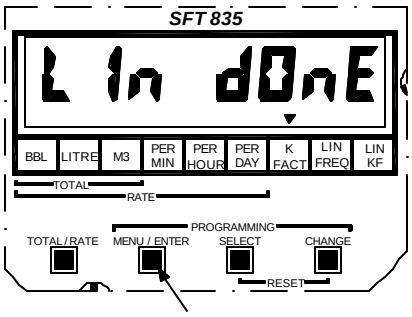


Once all seven digits of the K Factor have been entered, the decimal point position may be adjusted. Press the Select key until a flashing d appears on the left side of the display. Press the Change key to move the decimal point to the desired location.

When the desired K Factor is displayed, press the Menu / Enter key to save the displayed value into memory and end editing. Press the Menu / Enter key again to move on to the next linearization frequency.



Repeat the above steps for each of the linearization points entered in the PntS parameter.

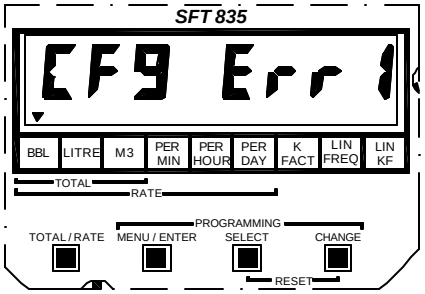


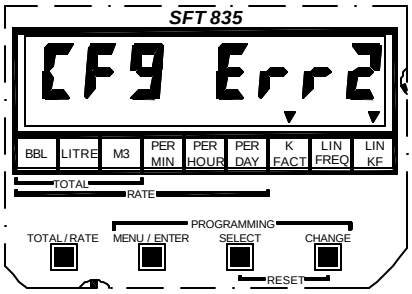
Once all of the linearization parameters have been entered the message Lin dOnE should appear on the display to indicate that all parameters are acceptable.

Linearization Error Messages

If the linearization parameters are not programmed properly the SFT835 will display an error message to indicate the problem.

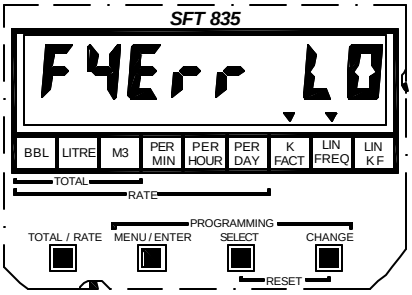
CFg Err1 may appear in place of Flow Total or Flow Rate to indicate that there is an error in the setup of the linearization parameters. If this error appears the linearization parameters should be verified for accuracy. Ensure that the parameters meet the requirements listed in the Setting the Linearization Frequencies and K Factorssection.





CFg Err2 may appear during the programming of the linearization K Factors to indicate an error. This error means that the difference between the current K Factor and either the previous or next K Factor is too large. The K Factors must be within a specified range of each other (see Setting the Linearization Frequencies and K Factorssection).

FxErr LO (where x is the current linearization point number) may appear during programming of the linearization frequencies to indicate that the current frequency is below the previous frequency. The linearization frequencies must be entered in ascending order (see the Programming the Linearization Frequencies and K Factorssection).



If any of these errors appear, they must be corrected before the SFT835 will resume normal operation.

Troubleshooting

Problem	Possible Solution
Flow Total is Incorrect	1. Verify K Factor 2. Ensure the turbine flow meter is in the correct direction 3. Verify that the Input Signal Indicator is flashing, if not check the magnetic pickup and verify that the connection is correct
Flow Rate is Incorrect	1. Same as above
Loop Current is Incorrect	1. Verify the FSr parameter 2. Load resistance is too large, increase loop voltage or reduce load resistance 3. Verify K Factor 4. Verify Flow Total is correct 5. Verify Flow Rate is correct
Pulse Output is Incorrect	1. Pulse Output maximum of 5Hz has been exceeded. Adjust dEC parameter or Pulse Output Multiplier to an appropriate value 2. Change K Factor to totalize in larger volume units 3. Load connected to Pulse Output draws more than 15mA 4. Verify Flow Total is correct 5. Verify Flow Rate is correct
CFg Err1 message is displayed instead of total or rate	1. There is an error in Linearization setup 2. Verify that the Linearization frequencies are in ascending order
CFg Err2 message is displayed instead of LIn dOnE	1. Verify that the Linearization frequencies are in ascending order 2. Verify that the difference between Linearization K Factors has not exceeded the allowable limit
FxErr LO is displayed	1. Linearization frequencies are not in ascending order

Specifications

SFT835

Power:		Loop power, 9VDC to 28VDC	
Current Consumption:		4 - 20 mA	
Ambient Temperature:		-40°C to +70°C (-40°F to +149°F)	
Humidity:		0% to 95% non condensing	
Inputs:	Turbine Input		
		Frequency:	1Hz to 3kHz
		Amplitude:	20mVp-p to 30Vp-p
	Reset Input		
		30VDC max. 10mS pulse min.	
Outputs:	Analog Output		
		Range:	4 - 20mA
		Accuracy:	±0.3% over operating temp. range
		Resolution:	16 bits (244nA)
		Loading:	750Ω max. @24VDC
	Pulse Output		
		Normally Open dry contact	
		Rating:	30VDC @ 10mA max.
		Output Frequency: 5Hz max.	
		Pulse Width:	6mS to 10mS
Program Memory:		10year battery backup for setup parameter retention	
Enclosure:		CSA Class I, Division I, Groups B, C, & D, NEMA4X	
Weight:		2.8kg (6.1lb)	